REMARKS

The amendments to claim 6 are supported in the original specification at page 7, lines 3-4, page 8, lines 20-27, and page 22, lines 16-18.

The Board of Patent Appeals and Interferences (BPAI) affirmed the examiner's final rejection over the combined disclosures of O'Lenick, Green and Sullivan, but they considered Sullivan to be "cumulative," i.e., redundant and unnecessary to the rejection.

The basis of the BPAI's affirmance was that they agreed with the examiner's position that "consists essentially of" did not exclude the presence of the free radical inhibitor described in O'Lenick. Now that the claims recite "consists of" the entire basis of the rejection and affirmance has been removed. To whatever extent one might have considered it obvious to eliminate the free radical inhibitor described in O'Lenick, the results demonstrated using applicants' invention are evidence sufficient to outweigh the evidence found in that reference.

The BPAI's reference to a disclosed product yield of 98.6% is found in Example 11 of O'Lenick, where a "stable free radical inhibitor" is present. The first 19 working examples of O'Lenick are relevant to the process of the instant claims, i.e., the production of alkoxyamines. Of those, only Example 1 with a 58.2% yield and Example 10 with a 68.2% yield were carried out without a free radical inhibitor. The average of the two examples referred to is 63.2%. The three working examples in applicants' specification that disclose the entire two step process are Examples 5, 7 and 8, which gave yields of 88%, 95.9% and 96.9%, respectively. That is an average yield of 93.5%. The lowest producing example in applicants' specification was 44% greater than the highest of the two relevant examples of the reference. When the average yield of

applicants' relevant three working examples is compared to the average yield of the two relevant working examples in the reference, that is an improvement of 48% or, in other words, about half again as much of the desired product is produced using applicants' invention. Anyone of ordinary skill in the art of chemistry would instantly recognize the commercial significance of that type of result. See, merely for example, *In re Lunsford*, 148 USPQ 716, 720 (CCPA 1966). See also page 59 of the Noller textbook (*Chemistry of Organic Compounds, 2d Ed.*, 1957), a copy of which is hereto attached, at footnote 5, where is states "organic chemists always are concerned with yield."

As has already been stated, the differences in result between applicants' process and that of the reference are immensely significant and neither the examiner nor the BPAI has provided any kind of explanation of why one of ordinary skill would have expected that result. In other words, the result is indeed unobvious.

In light of the foregoing amendments and remarks, it is believed that the examiner's rejection of the claims in the original application have been obviated, and passage of this application to issue is respectfully requested.

Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees to Deposit Account No. 11-0345. Please credit any excess fees to such deposit account.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

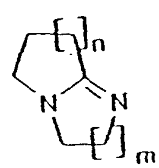
Amend claim 6 as follows:

6. (amended) A process for preparing a γ-alkoxyamine by

a) reaction of an α,β-unsaturated nitrile with a monohydric, dihydric or trihydric alcohol in the presence of a basic catalyst at from -20 to 200°C, optionally in the presence of a solvent, to form a β-alkoxynitrile, and

b) subsequent hydrogenation of the β-alkoxynitrile in the presence of a hydrogenation catalyst, optionally in the presence of a solvent, without prior removal or neutralization of said basic catalyst,

which consists [essentially] of using in the first step a diazabicycloalkene catalyst of the formula I



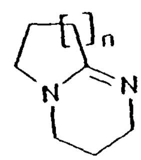
(I),

where from 1 to 4 hydrogen atoms on the diazabicycloalkene nucleus may be independently replaced by the radicals R^1 to R^4, in which case R^1, R^2, R^3 and R^4 are each C_{1-20}-alkyl, C_{6-20}-aryl or C_{7-20}-arylalkyl, and

n and m are each an integer from 1 to 6, and effecting the hydrogenation in the second step at from 50 to 250°C in the presence of a hydrogenation catalyst and of the catalyst of the formula I.

COPY OF ALL CLAIMS

2. A process as claimed in claim 6, wherein the catalyst used in the first step is a diazabicycloalkene of the formula Ia



(Ia),

where from 1 to 4 hydrogen atoms on the diazabicycloalkene nucleus may be independently replaced by the radicals R^1 to R^4, in which case R^1, R^2, R^3 and R^4 are each C_{1-20}-alkyl, C_{6-20}-aryl or C_{7-20}-arylalkyl, and

n is an integer from 1 to 3.

3. A process as claimed in claim 6, wherein the catalyst used in the first step is 1,5-diazabicyclo(4.3.0)non-5-ene (DBN), 1,5-diazabicyclo(4.4.0)dec-5-ene (DBD) or 1,8-diazabicyclo(5.4.0)undec-7-ene (DBU).

4. A process as claimed in claim 6, wherein the catalyst in the first step is used in an amount of from 0.05 to 5% by weight, based on the alcohol.

5. A process as claimed in claim 6, wherein the reaction of the first step is carried out at from 25 to 100°C.

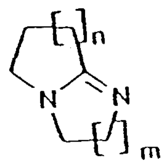
6. (amended) A process for preparing a γ-alkoxyamine by

a) reaction of an α,β-unsaturated nitrile with a monohydric, dihydric or trihydric alcohol in the presence of a basic catalyst at from -20 to 200°C, optionally in the presence of a solvent, to form a β-alkoxynitrile, and

b) subsequent hydrogenation of the β-alkoxynitrile in the presence of a hydrogenation catalyst, optionally in the presence of a solvent, without

prior removal or neutralization of said basic catalyst,

which consists of using in the first step a diazabicycloalkene catalyst of the formula I



(I),

where from 1 to 4 hydrogen atoms on the diazabicycloalkene nucleus may be independently replaced by the radicals R^1 to R^4, in which case R^1, R^2, R^3 and R^4 are each C_{1-20}-alkyl, C_{6-20}-aryl or C_{7-20}-arylalkyl, and

n and m are each an integer from 1 to 6, and effecting the hydrogenation in the second step at from 50 to 250°C in the presence of a hydrogenation catalyst and of the catalyst of the formula I.

Chemistry of Organic Compounds

CARL R. NOLLER

Professor of Chemistry, Stanford University

SECOND EDITION

1957

W. B. SAUNDERS COMPANY

Philadelphia *London*

In the presence of an excess of olefin, a second molecule can add to the alkyl hydrogen sulfate to give an alkyl sulfate.

$$\underset{\text{Ethyl hydrogen sulfate}}{CH_3CH_2OSO_2OH} + CH_2{=}CH_2 \longrightarrow \underset{\text{Ethyl sulfate}}{CH_3CH_2OSO_2OCH_2CH_3}$$

2. **Halogen Acids.** Olefins add halogen acids to give *alkyl halides.*

$$CH_3CH{=}CH_2 + HBr \longrightarrow \underset{\substack{|\\ Br}}{CH_3CHCH_3}$$

i-Propyl bromide
(2-bromopropane)

$$RCH{=}CR_2 + HX \longrightarrow \underset{\substack{|\\ X}}{RCH_2CR_2}$$

Halogen acids also add more readily the greater the amount of alkyl substitution at the double bond. For example, the order of ease of addition of hydrogen chloride is isobutylene > propylene > ethylene. The ease of addition varies also with the halogen acid, the order from concentrated aqueous solutions being hydrogen iodide > hydrogen bromide > hydrogen chloride > hydrogen fluoride.

The organic chemist recognizes that such qualitative statements are not exact. What does the statement mean that one reagent reacts more readily than another? Usually it means that the reaction (*1*) goes more rapidly under the same conditions, (*2*) proceeds at the same speed at lower temperatures, or (*3*) proceeds at lower pressures if the reaction takes place in the gas phase with a decrease in volume. It may mean, however, that the position of equilibrium is more favorable in one case than in another. More often than not it is not known whether the generalizations are based on relative rates or on relative positions of equilibria. Only the relative yields of desired products under the conditions of the reactions may be known.

Too often generalizations are made from comparisons under widely different conditions without consideration of the effect of solvent and of heterogeneous or homogeneous catalysts. For example, although neither gaseous nor aqueous hydrogen chloride adds to ethylene at an appreciable rate, anhydrous hydrogen chloride adds readily in the liquid phase at low temperature in the presence of anhydrous aluminum chloride. Here the question merely is one of providing a catalyst to enable the reaction to go at a practical rate. The product, ethyl chloride, is perfectly stable at room temperature. Although hydrogen fluoride in aqueous solution is less reactive than hydrogen chloride, anhydrous hydrogen fluoride adds rapidly to olefins to give yields of monofluoroalkanes up to 80 per cent,[5] even in the absence of a catalyst, provided that the reaction is carried out at $-45°$ in the presence of a large excess of hydrogen fluoride. If the monofluoroalkanes are allowed to warm to room temperature, however, they spontaneously decompose into olefin and hydrogen fluoride. Here the nonaddition at room temperature is not a matter of rate of addition but of position of equilibrium.

The general lack of knowledge concerning the fundamentals of even simple reactions is not surprising, because organic reactions are exceedingly numerous and complex. It is safe to say that organic chemistry has reached its present state of development because it has been handled not only as a science but as an art as well. Until future chemists reduce the qualitative statements to quantitative measurements, the former must continue to serve.

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[5] Organic compounds rarely are produced in the amount expected from a particular equation. Frequently the reaction is reversible and does not go to completion, and still more frequently several simultaneous or consecutive reactions take place starting with a given set of reactants. Moreover, mechanical losses usually occur during isolation of the product. For these reasons, organic chemists always are concerned with yield. The yield of the desired product usually is expressed as the per cent of the amount expected if the reaction took place quantitatively according to the equation.